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Global Survey of Early Warning Systems

Report of the Secretary-General**

Summary

A global survey of early warning systems was undertaken by the Secretary-General, pursuant to the request of the General Assembly in its resolution 61/198, with a view to advancing the development of global early warning system capacities for all natural hazards. The report on the survey was finalized in September 2006. It concluded that while some warning systems were well advanced, there were numerous gaps and shortcomings, especially in developing countries and in terms of effectively reaching and serving the needs of those at risk. The survey report recommended the development of a globally comprehensive early warning system, rooted in existing early warning systems and capacities. It also proposed a set of specific actions towards building national people-centred early warning systems, filling in the main gaps in global early warning capacities, strengthening the scientific and data foundations for early warning and developing the institutional foundations for a global early warning system. The present report, submitted in response to resolution 61/198, outlines the survey process and its conclusions and makes recommendations for follow-up actions by Member States and the United Nations system.

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I. Introduction

1. Altogether, during the period 1996-2005, disasters affected about 2.5 billion people and claimed the lives of nearly 900,000 people. The Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters,[1] sets out strategic goals, priority areas of action and institutional responsibilities for substantially reducing disaster risk over the decade. It identifies the need for developing early warning capacities and improving preparedness and response as part of a comprehensive approach that includes the integration of disaster risk reduction into development planning and practices and the building of a culture of prevention and capacities for resilience.

2. Past experience has shown that early warning can be a highly effective tool for saving lives and property in natural hazard events. Although the frequency of disasters has increased noticeably over the last 50 years, death tolls from disasters have generally declined, in large part owing to early warning and associated preparedness and response systems. The enormous losses of life in the major droughts, storms and floods of the 20th century have been substantially reduced. It is now not uncommon for early warnings to lead to the evacuation of a million people from areas at risk. For example, evacuations based on the hurricane forecasting and warnings that preceded Hurricane Katrina in 2005 undoubtedly saved many thousands of lives, even though the event also clearly demonstrated the limitations of technical early warning systems and the importance of a comprehensive disaster risk reduction approach, including public awareness and education for enhanced preparedness and response.

3. In its resolution 60/195, and others, on the International Strategy for Disaster Reduction, the General Assembly has consistently recognized the importance of early warning as an essential element of disaster risk reduction. Many key international agendas, forums and resolutions also refer to early warning systems as an important tool for disaster risk reduction, including the Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action, which was adopted at the World Conference on Natural Disaster Reduction (Yokohama 1994);[2] the Barbados Programme of Action for the Sustainable Development of Small Island Developing States (1994);[3] the Plan of Implementation of the World Summit on Sustainable Development (Johannesburg, 2002);[4] the conference statement of the Second International Conference on Early Warning (Bonn, 2003); the outcome of the International Meeting to Review the Implementation of the Programme of Action for the

[1] A/CONF.206/6 and Corr. 1, resolution 2. Available from http://www.unisdr.org/eng/hfa/hfa.htm.

[2] A/CONF 172/9, chap. I, resolution 1, annex I. Available from http://www.unisdr.org/eng/about_isdr/bd-yokohama-strat-eng.htm.

[3] *Report of the Global Conference on the Sustainable Development of Small Island Developing States, Bridgetown, Barbados, 25 April-6 May 1994* (United Nations publication, Sales No. E.94.I.18 and corrigenda), chap. I, resolution 1, annex II. Available from http://www.un.org/esa/sustdev/sids/sidstbc.htm.

[4] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August to 4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex. Available from http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf.

Sustainable Development of Small Island Developing States (Mauritius, 2005);[5] the response of the Group of Eight Summit to the Indian Ocean disaster, and future action on disaster risk reduction (Gleneagles, 2005) (see http://www.g8.gov.uk); and the Third International Conference on Early Warning (Bonn, 2006) (see http://www.ewc3.org). Early warning is an important objective in the processes of the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa,[6] in the food security activities of many United Nations and other international organizations, and in other humanitarian and environmental areas. Effective early warning systems will be an essential component of climate change adaptation strategies, given the projections by the Intergovernmental Panel on Climate Change[7] of increases in extreme weather and climate conditions in a warmer climate.

II. Origins and conduct of the Global Survey of Early Warning Systems

4. In January 2005, shortly after the Indian Ocean tsunami tragedy, and recognizing that thousands of lives would have been saved if an effective tsunami early warning system had been in place in the region, the Secretary-General called for a global early warning system that addressed all natural hazards and covered all nations. Subsequently, in his March 2005 report on the implementation of the Millennium Declaration, entitled "In larger freedom: towards development, security and human rights for all", he requested that a global survey of capacities and gaps for early warning systems be undertaken, as follows:

> The countries of the Indian Ocean region, with the help of the United Nations and others, are now taking steps to establish a regional tsunami early warning system. Let us not forget, however, the other hazards that people in all regions of the world are exposed to, including storms, floods, droughts, landslides, heat waves and volcanic eruptions. **To complement broader disaster preparedness and mitigation initiatives, I recommend the establishment of a worldwide early warning system for all natural hazards, building on existing national and regional capacity**. To assist in its establishment, I shall be requesting the International Strategy for Disaster Reduction secretariat to coordinate a survey of existing capacities and gaps, in cooperation with all United Nations system entities concerned, and I look forward to receiving its findings and recommendations (A/59/2005, para. 66).

5. The survey requested by the Secretary-General was coordinated by the secretariat of the International Strategy for Disaster Reduction through its Platform for the Promotion of Early Warning. At the eleventh session of the Inter-Agency Task Force for Disaster Reduction[8] in May 2005, a working group was formed to

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[5] *Report of the International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, Port Louis, Mauritius, 10-14 January 2005* (United Nations publication, Sales No. E.05.II.A.4 and corrigendum), chap. I, resolution 1, annexes I and II.

[6] United Nations, *Treaty Series*, vol. 1954, No. 33480.

[7] Reports of the Intergovernmental Panel on Climate Change are available from http://www.ipcc.ch.

[8] See http://www.unisdr.org/eng/task%20force/tf-meeting-11th-eng.htm.

provide guidance and support to the survey process and to prepare a report. The following were members of the working group: the Asian Disaster Preparedness Center; the Global Fire Monitoring Centre; the Climate Prediction and Application Centre of the Intergovernmental Authority on Development; the International Federation of Red Cross and Red Crescent Societies; the International Telecommunication Union (ITU); the United Nations Development Programme (UNDP); the United Nations Educational, Scientific and Cultural Organization (UNESCO); the United Nations Environment Programme (UNEP); the United Nations Human Settlements Programme (UN-Habitat); the United Nations Institute for Training and Research (UNITAR); the Office for the Coordination of Humanitarian Affairs (Co-Chair); the United Nations University (UNU) Institute for Environment and Human Security; and the World Meteorological Organization (WMO) (Co-Chair). On the basis of discussions at its eleventh session, the Inter-Agency Task Force for Disaster Reduction concluded that the survey should draw on readily available materials rather than undertake any new baseline studies.

6. In addition to requesting, at the end of 2005, through its resolution 60/195, the completion of preparation of the global survey, the General Assembly invited Member States to provide inputs that might assist the secretariat of the International Strategy for Disaster Reduction in preparing the survey.

7. The survey examined the available information that Governments and organizations had provided in preparation for the Second International Conference on Early Warning in October 2003 and for the World Conference on Disaster Reduction in January 2005, the latter comprising 122 country reports. In addition, Governments, relevant United Nations bodies and member organizations of the Inter-Agency Task Force for Disaster Reduction were invited, through a systematic survey, to provide further information. Twenty-two Governments[9] and the European Commission responded to that request for additional information on their capacities and gaps in early warning. Information was also received from the members of the above-mentioned working group of the Inter-Agency Task Force for Disaster Reduction and from other organizations, including the United Nations Children's Fund (UNICEF), the secretariat of the United Nations Convention to Combat Desertification, the World Food Programme (WFP), the Food and Agriculture Organization of the United Nations (FAO), the Asian Disaster Reduction Centre, the ProVention Consortium, the South Pacific Applied Geoscience Commission and the Joint Research Centre of the European Commission.

8. The survey considered early warning systems for hydro-meteorological and geological hazards principally, but also for related biological, environmental, humanitarian and industrial factors where relevant — for example famine, locust plagues and forest fires. It sought to identify early warning gaps and capacities as well as opportunities for remedies, for all parts of the world, and to develop recommendations for future action by Governments and organizations with the aim of developing more effective early warning systems. The survey considered institutional and governance mechanisms for warning systems. Many natural hazards span territorial borders and therefore require common practices and a range

[9] Argentina, Azerbaijan, Bangladesh, Bolivia, Canada, China, Cyprus, Egypt, El Salvador, Georgia, Greece, Guatemala, Iran (Islamic Republic of), Jamaica, Jordan, Mauritius, the Philippines, Portugal, Serbia and Montenegro (submitted prior to June 2006), Sweden, the United Arab Emirates and Yemen.

of international and regional mechanisms for the sharing of data and the dissemination of warnings. The survey report lists in an annex the names and roles of the numerous regional and international organizations that support the development and operation of early warning systems in regard to the following four components: (a) knowledge of risks; (b) monitoring and warning services; (c) warning dissemination and communication; and (d) emergency response capability.

9. A group of experts was convened by the secretariat of the International Strategy for Disaster Reduction on 12 December 2005 to review a working draft of the report and to provide further input on the conclusions and recommendations of the survey report. The working group of the Inter-Agency Task Force for Disaster Reduction also provided input. A consultation draft was circulated in January and February 2006, and a near-final version of the report was launched at the Third International Conference on Early Warning, held in Bonn from 27 to 29 March 2006. The report was finalized in September 2006.[10]

10. A conference room paper on the survey (A/C.2/61/CRP.1) was prepared for the Second Committee, under agenda item 53 (c), "Sustainable development: International Strategy for Disaster Reduction". Subsequently, the General Assembly, in its resolution 61/198 on the International Strategy for Disaster Reduction, requested the Secretary-General to submit a report on the results of the Global Survey of Early Warning Systems, including his recommendations on how to address associated technical, financial and organizational gaps and needs.

III. Main findings of the survey

11. Considerable progress has been made in developing the knowledge and technical tools required to assess risks and to generate and communicate forecasts and warnings, particularly as a result of growing scientific understanding and the increased use of modern information and communications technology. Early warning system technologies are now available for almost all types of hazards and are in operation in at least some parts of the world. The existing expertise and technical capacities in early warning systems provide a good basis for the development of networks, building on existing local or hazard-specific early warning systems, and for the implementation of new systems.

12. Nevertheless, there are significant inadequacies in existing early warning systems, as illustrated by the experience of the Indian Ocean tsunami in late 2004, Hurricane Katrina in the Gulf of Mexico in 2005 and other recent events such as heat waves, droughts, famine, wildfires, tsunami, floods and landslides. Early warning systems, especially in developing countries, lack basic equipment, staff with technical and operational skills, and financial resources, and for certain hazards resources are even non-existent. A major challenge is to integrate the knowledge and insight of relevant social and economic communities into the predominantly technically based existing systems, to translate hazard warnings into risk warnings and to include advice on how to respond to warning messages.

[10] Available from http://www.unisdr.org/eng/about_isdr/basic_docs/SG-report/SG-report-c2-61-CRPI-GSEWS.pdf.

13. One of the survey's key findings is that the weakest elements in early warning systems are generally the dissemination of warnings and the preparedness to respond. This is true for developing and developed nations alike. Warnings may fail to reach all those who need to take action, including local authorities, community-based organizations and the public at large, and are often not properly understood or taken seriously. A good understanding by the public and by community organizations of their real vulnerabilities and the risk posed by an event is often lacking. Root causes of such failures appear to be inadequate political commitment, weak coordination among an often diverse group of actors and insufficient public awareness and participation in the development and operation of early warning systems.

14. Other important findings of the survey include the following:

(a) Early warning systems are based on the nature of the hazard involved; the early warning needs for tsunami and for drought, for example, are very different. Current systems have been developed based on the specific technical knowledge of the hazard and on national circumstances;

(b) Global capacities for early warning must build on those hazard-focused roots and be integrated with international policy and technical capacities. A global early warning system must therefore be conceived as a network of systems, based on collaboration among the responsible authorities, to exchange data and knowledge, complement operational capacities and prepare the public in a coordinated way;

(c) There are wide disparities in the way in which the different hazards are handled. Weather-related hazards are generally well covered worldwide through Member State national meteorological and hydrological services. They are coordinated through the World Meteorological Organization system, and forecast accuracy has improved greatly over recent decades. Those types of capacities need to be extended to other hazards and to be complemented by other risk reduction measures;

(d) There is limited capacity for effective early warning systems in many developing countries, in particular in the least developed. In some cases they are virtually non-existent. Key requirements appear to be the development of national integrated risk reduction and risk management capabilities and improved technical equipment and training;

(e) By considering all hazards and vulnerabilities together, in a multi-hazard approach, and with a focus on reducing disaster risk, it should be possible to obtain gains in institutional effectiveness, operational efficiency and public preparedness in respect of early warning systems;

(f) The shortcomings that are present will require sustained attention by Governments and relevant organizations, as recognized in the Hyogo Framework for Action. Some gaps, such as tsunami early warning systems, are now clearly identified and are being supported by significant capacity-building efforts, but many others remain in need of appropriate attention.

IV. Recommendations of the survey report

15. The recommendations of the survey report are mainly aimed at Governments, international organizations and authorities responsible for the safety of citizens. The principal recommendation is to develop a global early warning system, based on a strengthening of existing capabilities. Four additional recommendations cover supporting areas of need. In each case a set of 10-12 specific actions are proposed in the report.

Survey recommendation 1
Develop a globally comprehensive early warning system, rooted in existing early warning systems and capacities

16. A global early warning system will require long-term sustained action by diverse players; strong political commitment to engender action and to make early warning a core task of national policy and disaster risk reduction strategy; strong international support and coordination, with clear roles and responsibilities; and wide participation of non-governmental, private sector and regional organizations. Specific actions are needed to build national capacities, fill the main gaps in global warning capacity, strengthen science and data foundations and develop global institutional foundations, as elaborated in the following four recommendations.

Survey recommendation 2
Build national people-centred early warning systems

17. Country-based early warning systems are needed for the protection of the citizens, and they also provide the building blocks of the global early warning system. They involve national, district-level and community-based capacities and are complete only when the necessary capacities for the dissemination of warnings and for preparedness and response are in place. The main challenges for countries are, firstly, to build or strengthen institutional capacities and, secondly, to engage effectively the affected population in the system. National action on early warning systems should be incorporated into and materially contribute to the national implementation of the Hyogo Framework for Action. One priority task is to ensure that at the national level the authority and political responsibility for issuing warnings is clearly established.

Survey recommendation 3
Fill the main gaps in global early warning capacities

18. There are many gaps to be filled, such as those for specific hazards, particularly at the national and regional levels. The development of a globally comprehensive early warning system will require multiple actions at all levels and in all sectors and cover hundreds of issues and criteria. One priority is to conduct a detailed survey of gaps and needs in regard to the hazards[11] and the associated vulnerabilities and warning capabilities, particularly in the developing and least developed countries, and to develop plans for the systematic strengthening of early

[11] The World Meteorological Organization has conducted an assessment of technical capacities for observing, monitoring, detecting and warning of weather-, climate- and water-related hazard at the national and regional levels, drawing on the contributions of 144 countries. A report on the assessment will be released during the fourth quarter of 2007.

warning capabilities for those hazards in countries in need. It is also recommended as a priority action that one major early warning project be implemented in each of the least developed countries, chosen on the basis of an assessment of the country's hazards, vulnerabilities and existing early warning capabilities.

Survey recommendation 4
Strengthen the scientific and data foundations for early warning

19. Scientific and technical expertise and capacity are the core foundations of early warning systems, particularly in respect to hazards and operational systems. However, there are several areas of weakness, such as the lack of knowledge of some hazard processes and risks, the absence of hazard and vulnerability mapping, and the limited engagement of relevant social sciences. The development of an international agenda on science and data-related needs for early warning should be part of the International Early Warning Programme and should include the active participation of national scientific groups, including young developing country scientists and associated training initiatives. The priority tasks include establishing internationally agreed standard methods for monitoring and mapping natural hazards and related societal vulnerabilities, including the development of hazard-relevant vulnerability indicators and their tracking, and the preparation of working tools to enable their implementation by countries.

Survey recommendation 5
Develop the institutional foundations for a global early warning system

20. The mechanisms of international and regional governance, coordination and support form one of the two pillars of a globally comprehensive early warning system, the other pillar being the capacities of individual countries. Those mechanisms provide clarity with respect to the roles and capacities of the relevant organizations, support necessary institutional partnerships, coordinate technical development and ensure appropriate mechanisms of accountability to Governments. The development of the International Early Warning Programme for multiparty action should facilitate a comprehensive global early warning system, which, guided by the Hyogo Framework for Action, would include overall strategies, clarification and documentation of mandates and responsibilities, a definition of standards and terminology, support of capacity-building and fostering of partnerships.

V. Actions in follow-up to the survey

21. The report on the Global Survey of Early Warning Systems was presented by the Under-Secretary-General for Humanitarian Affairs to the Third International Conference on Early Warning, held in Bonn from 27 to 29 March 2006. The Conference, in its final statement, welcomed the Survey and encouraged all partners to act upon its recommendations.

22. A round table on Indian Ocean Tsunami Warning and Response Systems was convened on 27 March 2006 by the secretariat of the International Strategy for Disaster Reduction and the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, in association with the Third International Early Warning Conference and in the presence of the United Nations Special Envoy for Tsunami Recovery. During the round table, a

number of International Strategy for Disaster Reduction system partners[12] announced the formation of a consortium to support initially up to 10 Governments with technical assistance in developing plans for accelerated implementation of a national tsunami early warning system. By the time the third session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System meeting was held in Bali in August 2006, 11 Governments[13] had submitted official requests with detailed proposals to receive financial and technical assistance from the Indian Ocean Consortium.

23. In association with the Third International Conference on Early Warning, and to provide guidance to Governments and communities on the implementation of effective people-centred early warning systems, a checklist for developing early warning systems was prepared by the Platform for the Promotion of Early Warning of the International Strategy for Disaster Reduction. The checklist was translated into the 6 official United Nations languages and 13 Indian Ocean regional languages and disseminated among Strategy system partners and to national and regional partners in Africa and Asia.

24. Also in association with the Third International Conference on Early Warning, the Platform for the Promotion of Early Warning coordinated the development of the *Early Warning Project Portfolio* database containing project proposals submitted by competent authorities and endorsed by their Governments. The proposals were subject to an expert peer review process and were presented to the Conference. In all, 105 project proposals were received and are available through the Platform's website.

25. A meeting of early warning stakeholders took place on 29 March 2006 following the Third International Conference on Early Warning to develop coordinated action to advance the International Early Warning Programme. Members of an interim Advisory Group were identified, who subsequently met in Bonn on 1-2 December 2006 to develop a work programme based on recommendations from the Global Survey.

26. The World Meteorological Organization convened a multi-agency Symposium on Multi-Hazard Early Warning Systems for Integrated Disaster Risk Management in Geneva from 23 to 24 May 2006. The Symposium (a) stressed the need for integration of early warning systems into national disaster risk reduction strategies, planning and legislative processes, supported by effective agency cooperation and coordination at the national to local levels to address linkages needed along the four components of early warning systems; (b) identified the need for international coordination mechanisms for provision of effective support from the international community to regional and national efforts for the implementation of early warning systems; and (c) recommended that good practices be documented to demonstrate the viability as well as the achievable potential benefits of an integrated and multi-hazard approach to early warning systems. Several demonstration projects have already been initiated to demonstrate and document good practices where early warning systems are supported by governance and legislation as well as by

[12] UNESCO and the Intergovernmental Oceanographic Commission; WMO; the Office for the Coordination of Humanitarian Affairs; UNDP; UNEP; the International Federation of Red Cross and Red Crescent Societies; and the World Bank.

[13] Comoros, Madagascar, Maldives, Mauritius, Mozambique, Pakistan, Seychelles, Somalia, Sri Lanka, Thailand and the United Republic of Tanzania.

organizational coordination and operational frameworks. A second symposium on multi-hazard early warning systems is planned for the first quarter of 2009.

27. Following one of the recommendations of the Global Survey, WMO conducted two surveys at the national and regional levels. A total of 139 countries participated in the national-level assessment, which provided a detailed analysis of the capacity of national meteorological and hydrological services to support disaster risk reduction, including early warning systems, at the national level. The regional-level assessment identified opportunities for collaboration and partnerships at the regional level to support national early warning systems, particularly in the developing and least developed countries. The reports on those assessments, together with an electronic database summarizing country priorities related to disaster risk reduction, will be available during the last quarter of 2007. On the basis of the identification of priorities and needs at the national and regional levels, several projects have been initiated for early warning system capacity development for the highest priority hazards, including flooding (riverine and flash flood), drought, sand and dust storms, severe storms and heat waves in nearly 40 countries in Africa, Asia, Europe and Central America.

28. From 26 to 27 March 2007, the first meeting of the Advisory Group of the International Early Warning Programme took place in Bonn, Germany.[14] The meeting was attended by representatives of the Asian Disaster Reduction Centre, the Convention on the Conservation of Migratory Species of Wild Animals, the German Committee for Disaster Reduction, FAO, the Global Fire Monitoring Centre, the International Federation of Red Cross and Red Crescent Societies, the Office for the Coordination of Humanitarian Affairs, UNEP, UNESCO and its Intergovernmental Oceanographic Commission, the United Nations Framework Convention on Climate Change, the United Nations Office for Outer Space Affairs, the UNU Institute for Environment and Human Security, WFP and WMO. The Advisory Group agreed that a comprehensive global early warning system should be built based on existing capacities, and noted that this required strengthened international and regional mechanisms for governance, coordination and support, including through more explicit responsibilities for various United Nations and other international agencies in the technical, humanitarian and development fields.

29. Following the 26 December 2004 Indian Ocean tsunami disaster a multi-agency, multi-donor Flash Appeal project was implemented during the period 2005 to 2006 to help Member States in the affected region to develop tsunami early warning systems. The project was coordinated by the Platform for the Promotion of Early Warning with the technical leadership of the Intergovernmental Oceanographic Commission. It involved the establishment of partnerships and coordination mechanisms across a wide range of partners and donors and provided an example of an integrated vehicle for supporting the implementation of the Hyogo Framework for Action and the establishment of the International Early Warning Programme. A report on flash appeal activities was submitted to donors in 29 June 2007.[15]

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[14] Documents of the meeting are available from http://www.unisdr.org/ppew/iewp/meetings.htm.

[15] United Nations, International Strategy for Disaster Reduction, Platform for the Promotion of Early Warning, "Evaluation and strengthening of early warning systems in countries affected by the 26 December 2004 Tsunami" (Geneva, 30 June 2007). Available from http://www.unisdr.org/ppew/tsunami/pdf/TEWS_donor_report.pdf.

30. In December 2006, as a follow-up to the 2005-2006 flash appeal project, a project on building resilience to tsunamis in the Indian Ocean, coordinated by the International Strategy for Disaster Reduction, was launched with the support of the European Community. The three-year initiative focuses particularly on India, Indonesia, Maldives and Sri Lanka and aims at building the resilience of communities and nations to disasters by strengthening national and local institutions, mechanisms and capacities for disaster risk reduction.

31. Various organizations have undertaken a number of communications and alerting activities that are relevant to the development of global early warning system capacities. Those include the following:

(a) The International Telecommunication Union is promoting the implementation of a standards-based all-media, all-hazard public warning system. The system is being designed in concert with the ongoing development of guidelines by all International Telecommunication Union sectors for application to all disaster and emergency situations;[16]

(b) The Humanitarian Early Warning Service is an inter-agency partnership project aimed at establishing a common platform for humanitarian early warnings and forecasts for natural hazards, by bringing together and making accessible in a simple manner the most credible early warning information available at the global level from multiple specialized institutions. The concept was proposed by the Inter-Agency Standing Committee and its sub-working group on preparedness and contingency planning in September 2004 and is being developed and supported by the World Food Programme;

(c) The Global Disaster Alert and Coordination System, a collaboration between the Joint Research Centre of the European Commission and the Office for the Coordination of Humanitarian Affairs, has been developed as a web-based platform that combines existing web-based disaster information management systems. Its aim is to alert the international community in case of major sudden-onset disasters and to assist in the coordination of international response during the relief phase;

(d) The United States Geological Survey, in collaboration with the Federal Communications Commission of the United States of America, is adopting and promoting the use of the Common Alerting Protocol and the development of fully digital next generation technologies and delivery systems to ensure the efficient and rapid transmission of Emergency Alert System alerts in a variety of formats, including text, audio and video, and via different means such as broadcast, cable, satellite and other networks;

(e) The members of the German Committee for Disaster Reduction have developed integrated real-time analysis and alerting systems, based on seismological, geodetic, marine and meteorological and satellite observation systems, including in support of the European flood forecasting exchange circle, the Seismic Early Warning for Europe project and the tsunami early warning system currently being implemented in Indonesia.

[16] International Telecommunication Union, *Final Acts of the Plenipotentiary Conference*, Antalya, Turkey, 2006, part II, "Decisions and resolutions", resolution 136 (Geneva, 2006).

VI. Conclusions and recommendations

32. Early warning is a readily understood concept, and early warning systems are well advanced for many hazards. There is widespread recognition of the need for early warning systems as an essential component of strategies to build resilience to natural disasters. Early warning is identified as a priority for action in the Hyogo Framework for Action. However, without further efforts at the local, national, regional and international levels, some hazards will continue to strike without warning, and existing early warning systems may continue to fail to reach people at risk or elicit appropriate lifesaving and property-saving responses. There is a need to develop more systematic global approaches to early warning systems, to cover all hazards and all communities, while making sure that the issuance of warnings, which could trigger responses from the international to local levels, remains a national responsibility.

33. The report on the Global Survey of Early Warning Systems provides a starting point for the task, as it outlines the main issues and identifies a range of specific needs for action by Governments, United Nations entities and other organizations concerned with the development of early warning systems. Its central recommendation is to develop globally comprehensive early warning systems, rooted in and composed of Member State early warning systems and capacities. As a first step, the Secretary-General will request that the Strategy secretariat, in collaboration with relevant actors, undertake an assessment of the financing of early warning systems, including the identification of gaps and shortfalls.

34. Coordinated planning is needed to define the priorities and practical objectives to be achieved and to ensure the engagement and participation of all relevant stakeholders. Such coordination should take place through existing relevant mechanisms, in particular by involving the major operational agencies through the International Early Warning Programme that was launched by stakeholders at the World Conference on Disaster Reduction in January 2005. The International Early Warning Programme was discussed at the Third International Conference on Early Warning in March 2006, following the release of the survey report, and by the Advisory Group of the International Early Warning Programme in March 2007. The Programme is designed to address the recommendations of the survey.

35. The secretariat of the International Strategy for Disaster Reduction and its Platform for the Promotion of Early Warning will continue to promote, advocate and facilitate resource mobilization for the development of early warning systems globally, including through the International Early Warning Programme.[17] The secretariat and its Platform will also foster inter-agency partnerships under the Strategy system, disseminate guidance information to national and regional actors, and raise awareness of the need to develop early warning systems. The secretariat will also establish a monitoring, evaluation and reporting mechanism for the International Early Warning Programme as part of the monitoring and reporting processes of the Hyogo Framework for Action.

36. In relation to the conclusions outlined above, the following recommendations are made:

[17] Supported and owned by agencies that are active with respect to the four components of early warning systems.

(a) The Secretary-General encourages Member States to ensure early warning systems are integrated in their national disaster risk reduction strategies and plans, supported by legislation and organizational coordination at international to local levels, and to implement the early warning-related priorities of the Hyogo Framework for Action, complemented by the recommendations of the third International Conferences on Early Warning, including the development of people-centred early warning systems, the filling of the gaps in global early warning capacities at national and local level, and the strengthening of the scientific and data foundations for early warning;

(b) Taking into account the findings of the Global Survey of Early Warning Systems and other surveys and actions undertaken by participating agencies and in order to complement and support the efforts of Member States in developing their national and local early warning capacities, the Secretary-General shall request the International Strategy for Disaster Reduction secretariat to facilitate, in cooperation with all United Nations system entities concerned, the development of globally comprehensive early warning systems, rooted in and composed of Member States systems, capacities and networks. To this end, the Secretary-General calls on Member States and other Strategy stakeholders to contribute to this process through financial and technical support.